United States
Environmental Protection
Agency

Office of
Air, Noise and Radiation
Washington, DC 20460

EPA

OMS
Advisory Circular

SUBJECT: Warning Devices for Emission Control System Maintenance

I. Purpose

This A/C is issued to clarify the provisions of the regulations (40 CFR §86.082-25(a))[1] with regard to the need for warning devices to alert vehicle operators to the need for emission control system maintenance. This advisory circular also applies to corresponding sections of the regulations for heavy-duty vehicles and engines and motorcycles. This advisory circular supersedes A/C No. 36A beginning with the 1983 model year.

II. Background

A. The regulations require manufacturers to obtain EPA approval prior to performing maintenance on durability vehicles for those components not specifically listed in §86.082-25(a)(1)(i)(A).[1] In the case of scheduled maintenance, the regulations state that EPA approval will be based on a satisfactory showing by the manufacturers that the maintenance is likely to be performed on vehicles in use. Such a showing should include either a warning device signaling the need for such maintenance or data showing that failure to perform the maintenance would result in a degradation of operator-perceived vehicle performance characteristics such as general driveability. EPA may elect to confirm by vehicle drive evaluation that driveability or performance degradations claimed by a manufacturer are sufficiently overt to provide incentive for maintenance. The showing may also require other proof of incentive as outlined in A/C No. 12A (such as free maintenance).

B. In the case of unscheduled maintenance, the regulations (40 CFR 86.082-25(a)(5)) state that EPA approval will be based on the determination that the need for maintenance is indicated by an overt indication of malfunction. An overt indication of malfunction may include activation of a warning device, either audible or visual. This general concept applies to all emission control devices including but not limited to EGR systems, catalytic converters, spark advance modulation devices, direct engine temperature sensing modulation devices, and oxygen sensors.

C. The regulations place restrictions on the frequency with which scheduled and unscheduled maintenance may be performed on catalyst and EGR systems and specifically condition the approval of such maintenance on the use of warning devices. Scheduled maintenance of EGR systems may be approved without a signal to the operator if EPA determines that failure to perform EGR system maintenance is not likely to result in an improvement to vehicle performance. Limitations were placed on catalyst and EGR system maintenance because it was concluded that performance of such maintenance on in-use vehicles would be unlikely without additional incentive. Warning devices are required to provide an incentive for in-use maintenance.

D.1. The use of engine-hour sensors has presented a problem of activation time versus vehicle mileage. Due to the variability of average driving speeds (about 5 percent for light-duty vehicles) and engine hour sensor error (typically 4 to 5 percent), the ±250-mile activation tolerance is often not practical for this type of sensor. The significant difference in cost between an electric engine-hour sensor and a mechanical vehicle mileage sensor prompted EPA to reassess its mileage tolerance policy. EPA has determined that activation of the maintenance warning device at a greater distance prior to the scheduled maintenance point is in keeping with the regulatory intent of insuring proper in-use maintenance notification. Therefore, for these devices, EPA has expanded the allowable activation point prior to the scheduled maintenance point while maintaining the 250-mile limit past the scheduled point.

2. An additional problem with many engine-hour sensors is that they cannot be reset, only replaced. A/C No. 36A stated EPA's policy that, "A warning device which is not replaced or reset by the action of performing maintenance may also be approved if sufficient assurance is given that the warning device will be replaced or reset when the maintenance is performed..." This A/C contains criteria for the acceptability of engine-hour activated warning devices that must be replaced in order to signal the next scheduled maintenance point.

E. Subsequent to the issuance of A/C No. 36A in 1977, EPA instituted abbreviated certification review procedures which allows the manufacturers to take certain certification actions without prior EPA approval. These procedures are outlined in §86.080-12. The provisions of this A/C are written pertaining to the full review procedure although some of the regulatory provisions referenced in this A/C fall under abbreviated review.

III. Applicability

The provisions of this A/C are applicable to all new motor vehicles and new motor vehicle engines for 1983 and later model years.

IV. Types of Acceptable Warning Devices

A. Warning devices may be audible and/or visual signals. An activated audible signal must be a noise readily heard within the vehicle. An activated visual signal must be a light or indicator on the instrument panel readily apparent both night and day. For example, if the visual signal is a light, it shall be of at least the same brightness as the brake failure or charge indicator warning light. A visual indicator must provide sufficient information such as "EGR" or "CATALYST" to alert the operator not only to the need for maintenance, but also to the system requiring maintenance. Colored markings on the odometer will not be sufficient notice to be acceptable, but flags that drop down and cover the numerals on the odometer may be acceptable.

B. There are two types of warning devices that are expected to be used by manufacturers to signal the need for scheduled maintenance: those activated by mileage and those activated by engine-hour accumulation. The mileage interval must be at least 12,500 miles (major engine tuneup interval) of durability mileage accumulation, or the equivalent in hours of engine operation.[2] Alternative mileage (or hours) may be approved if the manufacturer has demonstrated, as outlined in A/C No. 12A, that major engine tuneups are likely to be performed in-use at an interval other than 12,500 miles or that the subject maintenance is likely to be performed at an interval different than that at which major engine tuneups are performed. The manufacturer should retain supporting data in the manufacturer's Application for Certification to substantiate the equivalence of the engine-hour interval and the specified mileage interval if that hour interval is different than that assumed in this A/C.[2]

C. A warning device which signals the need for unscheduled maintenance may be activated either directly by the failure of an emission control system component itself or by the failure of another component whose failure would endanger the effectiveness or durability of the emission control system. However, if the warning device associated with a catalyst is activated by the failure of a component other than the catalyst, maintenance may nevertheless be performed only once. A warning device is considered to be associated with a catalyst if one of the maintenance actions to be performed in response to the activated warning device is servicing of the catalyst itself or if, in the case of a visual device, the device says "catalyst." If the manufacturer wants to be able to perform maintenance, such as replacing a misfiring spark plug, as many times as the warning device is activated, the warning device may not be labeled a catalyst warning device and servicing the catalyst will not be one of the maintenance options available (even though the maintenance may be related to the protection of the catalyst).

D.1. Where possible, performance of the required maintenance (scheduled or unscheduled) should be sufficient action to reset the warning device. A warning device which is not replaced or reset by the action of performing maintenance may also be approved if sufficient assurance is given that the warning device will be replaced or reset when the maintenance is

performed and the device is not easily reset or deactivated at other times. The warning device may not be self-resetting, i.e., deactivated after a time or mileage interval.

2. EPA will approve the use of engine-hour activated devices that must be replaced in order to be reset only if there is sufficient assurance that the consumer will approve the replacement. EPA will consider this condition met if the manufacturer replaces the device at no cost to the consumer.

E. The maintenance instructions furnished to the ultimate purchaser of the vehicle in accordance with 40 CFR §86.082-38(c)(1)[1] shall explain the conditions under which emission control system maintenance is to be performed (e.g., what type of warning device is employed and whether the device is activated by component failure or the need for periodic maintenance).

V. Conditions Under Which Maintenance May Be Performed On Certification Vehicles and Engines

A. Warning devices which signal the need for scheduled or unscheduled maintenance must be installed prior to the beginning of mileage accumulation on each test vehicle or engine representing vehicles or engines on which such devices are intended to be equipped in use.

B.1. For maintenance based on the activation of a warning device, audible or visual warning devices must be activated indicating the need for either scheduled or for unscheduled maintenance. Except as noted in paragraph V.B.2, following, for scheduled maintenance, the device must be activated within 250 miles of the mileage point (or equivalent hours) listed in the manufacturer's maintenance schedule furnished to the ultimate purchaser of the motor vehicle. For scheduled EGR system maintenance, that mileage point shall correspond to the scheduled major engine tuneup point (40 CFR 86.082-25(a)(3)).[1]

2. Manufacturers may request approval to use warning devices that cannot meet the ±250-mile tolerance interval (such as electronic engine hour timers). EPA will approve the use of these devices if the manufacturer can show, at a 90 percent confidence level, that in-use warning devices will activate no more than 250 miles beyond the scheduled maintenance point and no more than 20 percent of the scheduled mileage point (or 5,000 miles, whichever is less) before the scheduled mileage point. The actual scheduled maintenance on the test vehicle must be performed within ±250 miles of the scheduled maintenance point even though the device activates prior to the scheduled maintenance point.

C. EPA must be contacted as soon as possible after activation of any device alerting the vehicle operator to the need for either scheduled or unscheduled maintenance and prior to any diagnosis or maintenance. EPA may,

in accordance with 40 CFR 86.082-25(a)(11),[1] elect to verify the activation of the warning device prior to approving performance of the maintenance. EPA may also elect to observe the performance of the maintenance.

D. In the case of an engine-hour-activated warning device, EPA will determine, as discussed in Section IV.B, previous, if the hour operation interval is equivalent to a minimum mileage interval of 12,500 miles (or an alternate mileage interval approved by EPA as provided in A/C No. 12A). An hour meter is necessary in the test vehicle to demonstrate that the engine hour activated warning device is being activated correctly.

VI. Improper Activation of Scheduled Maintenance Warning Devices

A. If the warning device is activated prior to the mileage tolerance provided in paragraph V.B of this A/C, no emission control maintenance may be performed and the vehicle shall be stopped. EPA shall be given the opportunity to approve a plan for diagnosing the malfunction and to verify the existence of any malfunction before corrective unscheduled maintenance may be performed on the warning device. EPA will determine what corrective action, if any, may be taken, including the resetting of the device to activate at the scheduled point.

1. If EPA makes the determination that the failure is not likely to recur (see Section VIII, following) corrective unscheduled maintenance on the warning device will be permitted, and the vehicle allowed to continue mileage accumulation. In order to make this determination, EPA may require demonstration that the device would normally be activated only at the scheduled interval. If the action required to correct the device failure involves replacement of the sensor portion of the device, such demonstration may require the simulation of the mileage or engine-hour accumulation on the replacement device before it is installed on the vehicle. A description of the procedure for simulation must be submitted to and approved by EPA before the vehicle is repaired.

2. If EPA makes the determination that the failure is likely to recur, see Section VIII, following.

B. If the warning device is not activated at the scheduled mileage point, the manufacturer is advised to stop the vehicle no later than 200 miles (or equivalent hours) after the scheduled mileage point (in order to have sufficient time to perform the emission test required before the start of the engine and/or emission control system maintenance, which must be started not more than 250 miles after the scheduled mileage point). EPA shall be given the opportunity to approve a plan for diagnosing the malfunction and to verify the existence of any malfunction before corrective unscheduled maintenance may be performed on the device. EPA will determine what corrective action, if any, may be taken, including the resetting of the device to activate at the next scheduled point.

1. If EPA makes the determination that the failure is not likely to recur, corrective unscheduled maintenance on the warning device will be permitted, the emission control maintenance performed, the device reset, and the vehicle allowed to continue mileage accumulation. In order to make this determination, EPA may require demonstration that the device would normally be activated at the scheduled interval. If the action required to correct the device failure involves replacement of the sensor portion of the device, such demonstration may require the simulation of the mileage or engine-hour accumulation on the replacement device before it is installed on the vehicle. A description of the procedure for simulation must be submitted to and approved by EPA before the vehicle is repaired.

2. If EPA makes the determination that the failure is likely to recur, see Section VIII, following.

VII. Improper Activation of Unscheduled Maintenance Warning Devices

It is possible that a warning device intended to signal the need for unscheduled maintenance activates, and that upon proceeding to perform the indicated maintenance (which is subject to prior EPA approval as unscheduled maintenance) it is determined that the emission control component does not require maintenance. In such a case, EPA shall be given the opportunity to approve a plan for diagnosing the malfunction of the warning device and to verify the existence of any malfunction before corrective unscheduled maintenance may be performed on the warning device. EPA will determine what corrective action, if any, may be taken.

A. If EPA makes the determination that the failure is not likely to recur, corrective unscheduled maintenance on the warning device will be permitted, and the vehicle allowed to continue mileage accumulation. In order to make this determination, EPA may require demonstration that the device would normally be activated in response to certain conditions. If the action required to correct the device failure involves replacement of the sensor portion of the device, such demonstration may require the simulation of the mileage or engine-hour accumlation on the replacement device before it is installed on the vehicle. A description of the procedure for simulation must be submitted to and approved by EPA before the vehicle is repaired.

B. If EPA makes the determination that the failure is likely to recur, see Section VIII, following.

VIII. Procedures for Cases of Recurring Failures of Warning Devices

If the EPA makes the determination that the failure of a warning device system or a specific component of a warning device system, is likely to recur because it is inherently defective in terms of design or materials, the manufacturer has two options:

A. The vehicle equipped with the specific component or warning device that EPA has determined to be subject to recurrent failure (and all of that manufacturer's other durability vehicles which are similarly equipped) may continue mileage accumulation without performance of the applicable emission control maintenance until mileage accumulation is completed or until a substitute warning device is approved in accordance with the provisions of Section IX. If none of the durability vehicles has received emission control system maintenance based upon the warning device in question, the manufacturer may seek certification of the vehicles without warning devices and reflect in the maintenance instructions that no maintenance to the emission control system in question is necessary.

B. The vehicle equipped with the specific component or warning device system that EPA has determined to be subject to recurrent failure may be stopped (and all of the manufacturer's other durability vehicles which are similarly equipped, will also be stopped at least 1,000 miles prior to the next scheduled maintenance point for each vehicle) until the manufacturer has qualified a substitute warning device in accordance with Section IX below. If the warning device is intended to signal the need for unscheduled maintenance, the vehicles affected must be stopped without further mileage accumulation until the manufacturer has qualified an update of the warning device in accordance with Section IX. The substitute warning device or component would then be installed in all such durability vehicles, pre-set as appropriate to the mileage or engine-hour point at which each vehicle was stopped, and mileage accumulation resumed. If this alternative is elected, maintenance may be performed as the signal for such maintenance is activated after the restarting of the vehicles.

IX. Substitution of Warning Devices

If the manufacturer wishes to substitute for use on durability vehicles or production vehicles warning devices which are not in all material respects identical to the devices installed on the durability vehicles, EPA may elect to specify the requirements it deems necessary to demonstrate the performance and reliability of the substitute device. These requirements may consist of: (a) durability vehicle(s) run for up to 50,000 miles with the new warning device installed and functioning, (b) a simulated 50,000 miles on a test stand approved in advance by EPA, or (c) such combination of (a) and (b) above as may be determined to be appropriate.

X. Use of Warning Device Test Systems

A. A manufacturer may elect to install a warning device test system. The function of this test system would be to determine if the warning system is operational and to allow for the performance of unscheduled maintenance to the warning system should the system malfunction. Examples of acceptable systems are:.

1. A "press-to-test" button to indicate if the warning device is functioning.

2. A circuit that tests the warning device during engine starting.

B. Use of any such system requires explanation to the vehicle owner in the maintenance and use instructions.

Office of Mobile Sources

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1. Or corresponding sections of the regulations for subsequent model years and other mobile sources (heavy-duty vehicles and engines and motorcycles).

2. One hour of engine operation will be assumed to be equivalent to:

- 30 miles for light-duty classes
- 50 kilometers for motorcycles
- 33.3 miles for gasoline-fueled heavy-duty engines (for vehicle or dynamometer operation)
- 33.3 miles for diesel heavy-duty engines (for vehicle operation)
- 100 miles for diesel heavy-duty engines (for dynamometer operation)